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EFFECT ON GINNING AND SPINNING EFFICIENCY AND COTTON QUALITY OF

- Fiber Moisture
- Seed-Cotton Cleaning
- Lint Cleaning

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Effect On Ginning and Spinning Efficiency and Cotton Quality Of

- Fiber Moisture
- Seed-Cotton Cleaning
- Lint Cleaning

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SUMMARY

A study was conducted at the Southeastern Cotton Ginning Research Laboratory, Clemson, S.C., to determine the effects of fiber moisture, seed-cotton cleaning, and lint cleaning on efficiency of seed-cotton and lint-cleaning systems, classification, fiber and spinning quality, and returns to the producer.

In 1968, all lots were processed at a fiber-moisture level of 6 to 8 percent, but in 1969 and 1970, levels of 6 to 8 and 3 to 4 percent were used. A conventional seed-cotton cleaning system was used for one-half of all lots. For the other one-half, the stick-and-green-leaf machine was bypassed. Lint was processed through one, two, or three saw-type lint cleaners.

The fiber-moisture level of 3 to 4 percent during processing resulted in improved efficiency of the seed-cotton and lint-cleaning systems, improved color of the lint, higher grades, higher unit lint price, and lower picker and card waste in spinning lots, than resulted from processing at a fiber-moisture level of 6 to 8 percent. The 6 to 8 percent level resulted in higher 2.5-percent span length, uniformity ratio, fiber strength, staple length, lint turnout, 50s and 22s yarn strength, break factor, and appearance index. Bale value did not differ by fiber-moisture level during processing.

Bypassing the stick-and-green-leaf machine increased lint turnout, but did not affect any other test item.

Processing lint through two or three stages

of saw-type lint cleaning decreased lint foreign-matter content and improved the color and grade over that of lint processed through one stage of cleaning. These treatments also produced a higher unit lint price and bale value.

Staple length, 2.5-percent span length, uniformity ratio, and lint turnout decreased when the second and third stages of lint cleaning were added. The second stage of lint cleaning reduced picker and card waste, but adversely affected 50s and 22s yarn strength, break factor, and appearance.

The optimum combination of gin-processing performance, preservation of fiber qualities, and returns to producers in the Southeast seems likely when: (1) Fiber-moisture level at the feeder apron is maintained at 6 to 8 percent, (2) the seed-cotton conditioning and cleaning system consists of: Automatic feed control, seed-cotton drier, cylinder cleaner, stick-and-green-leaf machine, seed-cotton drier, and cylinder cleaner, and (3) two stages of saw-type lint cleaning are used. A total of 12 to 14 cylinders in the two cylinder-type cleaners should provide sufficient cleaning.

The stick-and-green-leaf machine is recommended, even though it had little effect in these tests. Trash levels of cottons harvested in the Southeast generally exceed those of cottons used in these tests, requiring the additional cleaning provided by the stick-and-green-leaf machine. Adequate bypasses should be used to prevent excessive cleaning in the seed-cotton and lint-cleaning systems.

INTRODUCTION

New and improved cotton varieties, changes in cultural and harvesting practices, and modification of gin machinery and techniques have made a review of recommended ginning practices necessary from time to time. Marketing trends and specific quality factors required by processors and manufacturers of cotton and cotton products have also influenced ginning practices.

The ginner must be capable of selecting the proper combination of machinery and techniques that will contribute to: (1) Maximum preservation of fiber quality during gin processing to supply needed qualities, (2) maximum returns to the producer, and (3) increased operational efficiency of the gin plant.

Maintaining cotton's inherent fiber qualities during gin processing will improve its competitive position in the fibers market and contribute to greater returns to the producer.

OBJECTIVES

The major objective of the study was to determine the effect of fiber moisture, seed-cotton cleaning, and lint cleaning on efficiency of cleaning systems for seed, cotton and lint classification, fiber and spinning quality, and returns to the producer.

PROCEDURE

Sources of Cotton

Test cottons were grown by a private producer in Oconee County, S.C., using cultural and harvesting practices generally recommended for this area. They were grown on predominantly Cecil and Hiwassee sandy loam soils. Varieties used were PD-2165 in 1968 and 1969, and Coker 201 in 1970.

All cottons were harvested with a spindle-type picker from fields that had not been harvested previously.

Ginning

Gin processing was performed in the Southeastern Cotton Ginning Research Laboratory

gin with a high-capacity gin stand and other standard gin machinery.

Moisture content of fiber was determined before each test lot was processed. Temperatures in the drying system were adjusted to achieve a predetermined fiber-moisture level at the feeder apron. In 1968, projected fiber-moisture content of all lots at the feeder apron was 6 to 8 percent. In 1969 and 1970, projected fiber moisture for one-half of the lots was 6 to 8 and for the other one-half, 3 to 4 percent. The 6 to 8 percent is designated as normal and the 3 to 4 as low fiber moisture.

Machinery sequence in the conditioning and seed-cotton cleaning system was as follows: (1) Suction telescope, (2) separator, (3) automatic-feed control, (4) 24-shelf tower drier, (5) 7-cylinder cleaner, (6) stick-and-green-leaf machine, (7) 24-shelf tower drier, (8) 7-cylinder cleaner, (9) separator, and (10) distributor.

One-half of the lots were processed through the entire sequence of machinery, called here the conventional seed-cotton cleaning system. The remaining lots bypassed the stick-and-green-leaf machine in the experimental seed-cotton cleaning system.

Lint from each fiber-moisture and seed-cotton cleaning treatment was processed through one, two, or three saw-type lint cleaners. This gave 12 separate combinations of variables, which could be compared to show differences between high and low fiber-moisture content; between the conventional and the experimental seed-cotton cleaning systems; and between the three levels of lint-cleaning.

The seed-cotton input control and the feed rolls on the extractor-feeder were adjusted for a continuous processing rate of 4 to 5 bales per hour for all test lots.

Seed cotton was removed from the transport unit through the wagon suction telescope and separator and deposited in a weighing hopper. Approximately 1,400 to 1,450 pounds were accumulated on the floor below the hopper to provide enough cotton for full-size bale test lots. Seed cotton was then picked up by the suction telescope inside the gin plant for introduction into the conditioning and seed-cotton cleaning system.

Original lot weights, seed weights, and lint weights were recorded. Portable hygrothermographs recorded temperature and relative humidity inside the gin. Temperature was recorded just before the point where the hot air and seed cotton were mixed. The elapsed time for the drying, cleaning, and ginning phases were recorded.

Samples of seed cotton, seed, and lint were obtained at various stages of processing for evaluation of moisture, processing performance, and quality.

Fiber and Spinning Tests

Samples for lint foreign-matter content and fiber testing were obtained before lint cleaning. Samples were also obtained after lint cleaning for foreign-matter content, classification, fiber testing, and spinning tests. Samples for spinning tests were obtained only from those lots subjected to one or two lint cleaners.

Ginned lint was tested for fiber length, strength, and fineness by the Fibrograph, Pressley, and Micronaire tests, respectively. Lint foreign-matter content was determined by the Shirley Analyzer, and color by the Colorimeter.

RESULTS

Statistical Analyses

Variables for 1969 and 1970 were two fiber-moisture levels, two seed-cotton cleaning levels, and three lint-cleaning levels, with three replications. Comparisons of the three test variables and test items, other than spinning, were made through an analysis of variance for a split-split plot design combined over years. The main-plot factor was fiber moisture. Subplots were the two seed-cotton cleaning treatments, and sub-subplots were the three lint-cleaning treatments. Only the normal fiber-moisture level was used in 1968; therefore, variables for 1968, 1969, and 1970, at one fiber-moisture level, were two seed-cotton cleaning levels and three lint-cleaning levels. Comparisons of the two test variables and test items, other than spinning, were made through an analysis of variance for a split-plot design combined over years. The main-plot factor was seed-cotton

cleaning. Subplots were the three lint-cleaning treatments.

Variables for 1969 and 1970 spinning tests were two fiber-moisture levels, two seed-cotton cleaning levels, and two lint-cleaning levels. Variables for 1968, 1969, and 1970 spinning tests at normal fiber moisture were two seed-cotton cleaning levels and two lint-cleaning levels. The experimental designs described above were used to analyze these data.

Results of statistical analyses are summarized in tables 11, 12, 13, and 14.

Seed Cotton

Wagon seed-cotton trash content averaged 3.6 percent for the combined 1969 and 1970 seasons (table 1). No individual test lot exceeded 5.3 percent. Trash content of cottons processed at the higher fiber-moisture level in 1968, 1969, and 1970 averaged 3.4 percent.

Wagon seed-cotton moisture content averaged 12.1 percent in 1969, significantly higher than the 1970 average of 9.0, but there were no differences in seed-cotton moisture content among levels of each test variable (tables 1 and 15). Wagon seed-cotton moisture content of cottons processed at normal fiber-moisture level in 1968 to 1970 averaged 10.8 percent (table 1).

TABLE 1.—Seed-cotton trash and moisture content, wagon samples

Crop years	Seed-cotton trash content	Seed-cotton moisture content
	Percent	Percent
1969-----	3.3	¹ 12.1a
1970-----	3.9	9.0 b
Average-----	3.6	10.5
1968 ² -----	3.3	11.0
1969 ² -----	3.2	12.0
1970 ² -----	3.8	9.4
Average-----	3.4	10.8

¹ Means not followed by a common letter differ at a 5-percent level of significance.

² Includes only those cottons processed at normal fiber-moisture level.

Fiber-Moisture Levels

Good control of fiber-moisture content was achieved in the conditioning system. Moisture content of ginned lint averaged 6.0 percent for those cottons processed at temperatures calculated to reduce fiber-moisture content to 6 to 8 percent at the feeder apron (table 2). For those cottons processed at temperatures calculated to reduce fiber moisture to 3 to 4 percent at the feeder apron, moisture content of ginned lint averaged 3.9 percent.

Seed-cotton moisture content at the feeder apron of cottons processed at the normal moisture level was 9.6 percent, significantly higher than the 8.2-percent moisture content of cottons processed at the low moisture level. Fiber-moisture processing level had no effect on seed moisture (table 16).

The fiber-moisture level during processing significantly affected seed-cotton cleaning-system efficiency, increasing from 54.2 at the normal moisture level to 62.3 percent at the low moisture level (table 3).

Both visible and total waste in lint before and after lint cleaning decreased as the fiber-moisture level decreased (table 3). Visible waste decreased from 6.7 to 5.3 percent before lint cleaning and from 2.0 to 1.5 percent after lint cleaning. Total waste in lint decreased from 8.1 to 6.5 percent before lint cleaning and from 3.1 to 2.4 percent after lint cleaning.

Fiber-moisture level had no effect on degree of yellowness (+b) of lint before lint cleaning (table 3), but after lint cleaning, degree of yellowness of lint from cottons processed at the low fiber-moisture level was 9.1, signifi-

cantly higher than the 9.0 value for lint from cottons processed at the normal fiber-moisture level. Reflectance (R_d) of lint from cottons processed at the low fiber-moisture level was 72.6 before lint cleaning, significantly higher than the 71.9 value for lint from cottons processed at the normal fiber-moisture level. Reflectance, after lint cleaning, of lint from cottons processed at low fiber moisture was 74.7, significantly higher than the 74.2 value for lint from cottons processed at normal fiber moisture.

Uniformity ratio and 2.5-percent span length were affected by fiber-moisture level during processing, decreasing both before and after lint cleaning as the fiber-moisture level decreased (table 3). Before lint cleaning, 2.5-percent span length of lint from cottons processed at the normal fiber-moisture level was 1.13 inches, compared with 1.12 for lint from cottons processed at the low fiber-moisture level. After lint cleaning, these values were 1.12 and 1.10 inches for the normal and low fiber-moisture levels, respectively.

Uniformity ratio decreased from 48 to 47 percent before lint cleaning and from 47 to 46 percent after lint cleaning, when cottons were processed at the low fiber-moisture level.

There was a significant decrease in strength after lint cleaning as the fiber-moisture level during processing decreased. Fiber strength after lint cleaning decreased from 24.2 to 23.7 grams per tex at the low fiber-moisture level (table 3). Micronaire readings were not affected by fiber-moisture level during processing.

Grade index and unit lint price based on local Commodity Credit Corporation support

TABLE 2.—*Moisture content of seed cotton, lint, and seed at two fiber-moisture processing levels*

Fiber-moisture level	Moisture content of—				
	Seed cotton at wagon	Seed cotton at feeder apron	Lint before lint cleaning	Lint at lint slide	Seed at seed drop
	Percent	Percent	Percent	Percent	Percent
High, 6 to 8 percent.....	10.7	¹ 9.6a	¹ 6.0a	¹ 5.6a	11.3
Low, 3 to 4 percent.....	10.4	8.2 b	3.9 b	3.9 b	10.9
Average.....	10.55	8.9	4.95	4.75	11.1

¹ Means not followed by a common letter differ at the 1-percent level of significance.

TABLE 3.—*Effect of fiber moisture on selected test items*

Test item	Fiber moisture		Level of significance
	Normal— 6 to 8 percent	Low— 3 to 4 percent	
Seed-cotton cleaning-system efficiency...percent....	54.2	62.3	0.01
Visible waste in lint:			
Before lint cleaning.....do....	6.7	5.3	.01
After lint cleaning.....do....	2.0	1.5	.01
Total waste in lint:			
Before lint cleaning.....do....	8.1	6.5	.01
After lint cleaning.....do....	3.0	2.4	.01
Degree of yellowness:			
Before lint cleaning.....+b..	8.5	8.6	None
After lint cleaning.....+b..	9.0	9.1	.05
Reflectance:			
Before lint cleaning.....R _d ..	71.9	72.6	.05
After lint cleaning.....R _d ..	74.2	74.7	.01
2.5-percent span length:			
Before lint cleaning.....inch..	1.13	1.12	.05
After lint cleaning.....do....	1.12	1.10	.01
Uniformity ratio:			
Before lint cleaning.....percent..	48	47	.05
After lint cleaning.....do....	47	46	.05
Strength, $\frac{1}{8}$ -inch gage:			
Before lint cleaning.....grams per tex..	24.3	23.9	None
After lint cleaning.....do....	24.2	23.7	.05
Micronaire:			
Before lint cleaning.....reading..	4.9	4.8	None
After lint cleaning.....do....	4.8	4.8	None

price increased, but staple length and lint turnout decreased, as the fiber-moisture level during processing decreased. Grade index increased from 94.3 to 96.9, price per pound increased from 22.62 to 22.94 cents, staple length decreased from 35.5 to 34.9, and lint turnout decreased from 522 to 509 pounds at the lower fiber-moisture level (table 4). Bale value and seed germination were not affected by fiber-moisture level.

Spinning-test results were affected significantly by fiber-moisture level during processing in the gin. Picker and card waste decreased from 5.9 to 5.6 percent, 50s yarn strength decreased from 42 to 39 pounds, 22s yarn strength decreased from 118 to 113 pounds, and break factor decreased from 2,345 to 2,217 units at the low fiber-moisture level (table 4). Yarn appearance was not affected by fiber-moisture level during gin processing.

Seed-Cotton Cleaning Levels

The seed-cotton cleaning level had no significant effect on any test items except lint turnout. Bypassing the stick-and-green-leaf machine increased the turnout per 1,500 pounds of seed cotton from 511 to 519 pounds (tables 17, 18, 19, and 20). The small differences in each test item between the two levels failed to establish a trend attributable to the seed-cotton cleaning level.

Lint-Cleaning Levels

Lint cleaning reduced visible and total waste in lint significantly, and each additional stage of lint cleaning resulted in a further significant decrease (table 5). The first stage of lint cleaning reduced visible waste in lint from 6.4 to 2.6 percent. Visible waste in lint after two and three stages was 1.5 and 1.1 percent, respectively. Total waste in lint was reduced from

7.7 to 3.7 percent by the first stage of lint cleaning. After two and three stages of lint cleaning, total waste was 2.4 and 2.1 percent, respectively. Similar results were obtained with cottons processed at the higher moisture level.

Lint cleaning improved the color quality of lint as determined by the Colorimeter (table 6). Degree of yellowness (+b) was increased from 8.6 to 8.9 by one stage of lint cleaning.

After two and three stages of lint cleaning it was 9.0 and 9.1, respectively. No further significant improvement was achieved by the third stage of lint cleaning.

Reflectance (R_d) of lint increased with each succeeding stage of lint cleaning. One stage of lint cleaning increased reflectance from 72.1 to 73.8. After two and three stages, reflectance was 74.5 and 75.0, respectively.

TABLE 4.—*Effect of fiber moisture on selected test items*

Test item	Fiber moisture		Level of significance
	Normal— 6 to 8 percent	Low— 3 to 4 percent	
Grade.....index..	94.3	96.9	0.01
Staple..... $\frac{1}{32}$ inch..	35.5	34.9	.01
Unit lint price, CCC support price..cents per pound..	22.62	22.94	.05
Lint turnout.....pounds..	522	509	.01
Bale value, CCC support price.....dollars..	118.00	119.32	None
Seed germination.....percent..	78.7	80.9	None
Picker and card waste.....do..	5.9	5.6	.05
50s yarn strength.....pounds..	42	39	.01
22s yarn strength.....do..	118	113	.01
Break factor.....units..	2,355	2,217	.01
Yarn appearance.....index..	98	98	None

TABLE 5.—*Effect of lint-cleaning level on visible and total waste in lint*

Lint-cleaning level	Visible waste in lint		Total waste in lint	
	Before lint cleaning	After lint cleaning	Before lint cleaning	After lint cleaning
	Percent	Percent	Percent	Percent
1969 and 1970 seasons:				
1.....	¹ 6.4a	¹ 2.6a	¹ 7.7a	¹ 3.7a
2.....	5.7 b	1.5 b	7.1 b	2.4 b
3.....	5.8 b	1.1 c	7.1 b	2.1 c
Average.....	6.0	1.7	7.3	2.7
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)				
1.....	(²)	¹ 2.6a	(²)	¹ 3.6a
2.....	(²)	1.6 b	(²)	2.5 b
3.....	(²)	1.1 c	(²)	2.1 c
Average.....	(²)	1.8	(²)	2.7

¹ Means within a column followed by the same letter or letters do not differ significantly from each other at the 1-percent level.

² Data not available for 3 years.

Uniformity ratio and 2.5-percent span length decreased when the second stage of lint cleaning was added, but no further decrease resulted when the third stage of cleaning was

added (table 7). Uniformity ratio was 47 percent after one stage of cleaning and 46 percent after the second and third stages of cleaning. Span length decreased from 1.12 inches after

TABLE 6.—*Effect of lint-cleaning level on Colorimeter results*

Lint-cleaning level	Degree of yellowness		Reflectance	
	Before lint cleaning	After lint cleaning	Before lint cleaning	After lint cleaning
	+b	+b	R _d	R _d
1969 and 1970 seasons:				
1.....	8.6	¹ 8.9a	72.1	¹ 73.8a
2.....	8.6	9.0 b	72.5	74.5 b
3.....	8.6	9.1 b	72.2	75.0 c
Average.....	8.6	9.0	72.3	74.4
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)				
1.....	(²)	¹ 8.6a	(²)	¹ 71.9a
2.....	(²)	8.8 b	(²)	72.8 b
3.....	(²)	8.8 b	(²)	73.2 b
Average.....	(²)	8.7	(²)	72.6

¹ Means within a column followed by the same letter or letters do not differ significantly from each other at the 1-percent level.

² Data not available for 3 years.

TABLE 7.—*Effect of lint-cleaning level on 2.5-percent span length and length uniformity*

Lint-cleaning level	2.5-percent span length		Uniformity ratio	
	Before lint cleaning	After lint cleaning	Before lint cleaning	After lint cleaning
	Inches	Inches	Percent	Percent
1969 and 1970 seasons:				
1.....	1.13	¹ 1.12a	48	¹ 47a
2.....	1.13	1.10 b	48	46 b
3.....	1.12	1.10 b	48	46 b
Average.....	1.13	1.11	48	46
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)				
1.....	(²)	¹ 1.12a	(²)	¹ 47a
2.....	(²)	1.11 b	(²)	46ab
3.....	(²)	1.10 b	(²)	46 b
Average.....	(²)	1.11	(²)	46

¹ Means within a column followed by the same letter or letters do not differ significantly from each other at the 1-percent level.

² Data not available for 3 years.

one stage of cleaning to 1.10 after two and three stages of cleaning.

Fiber strength and Micronaire reading were not affected by lint-cleaning level (table 8).

Grade index and unit lint price, based on local CCC support price, increased with each additional stage of lint cleaning (table 9). Grade index increased from 92.3 after one stage of lint cleaning to 95.9 and 98.5 after two and three stages of cleaning, respectively. Price per pound of lint following one, two, and three stages of lint cleaning was 21.74, 23.27, and 24.13 cents, respectively. The second and third stages of lint cleaning reduced staple length to 35.1, significantly lower than the 35.4 staple length of lint processed through one stage of lint cleaning.

Lint turnout after the second stage of cleaning was 513 pounds per 1,500 pounds of seed cotton, significantly lower than the turnout of 524 pounds after one stage of cleaning. No fur-

ther significant decrease resulted when the third stage was added.

Bale value increased significantly from \$113.85 after one stage of lint cleaning to \$119.39 after two stages of cleaning, but a further increase to \$122.75 after three stages of cleaning was not significant.

Increases in grade and price per pound of lint due to additional stages of lint cleaning were partly offset by decreases in staple length and lint turnout.

When compared with one stage of lint cleaning, the second stage of cleaning reduced picker and card waste in spinning samples, but adversely affected 50s and 22s yarn strength, break factor, and appearance (table 10). Picker and card waste was reduced from 6.1 to 5.5 percent; 50s yarn strength from 41 to 40 pounds; 22s yarn strength from 117 to 114 pounds; break factor from 2,314 to 2,249; and appearance index from 99 to 97, when the second stage of lint cleaning was added.

TABLE 8.—*Effect of lint-cleaning level on fiber strength and Micronaire reading*

Lint-cleaning level	Strength, $\frac{1}{8}$ -inch gage		Micronaire	
	Before lint cleaning	After lint cleaning	Before lint cleaning	After lint cleaning
	Grams/tex	Grams/tex	Reading	Reading
1969 and 1970 seasons:				
1-----	24.1	24.0	4.9	4.8
2-----	24.0	23.9	4.9	4.8
3-----	24.2	23.9	4.8	4.8
Average-----	24.1	23.9	4.9	4.8
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)				
1-----	(1)	25.3	(1)	4.7
2-----	(1)	25.1	(1)	4.8
3-----	(1)	25.1	(1)	4.7
Average-----	(1)	25.2	(1)	4.7

¹ Data not available for 3 years.

TABLE 9.—*Effect of lint-cleaning level on classification, lint turnout, and lint value*

Lint-cleaning level	Grade (Middling White = 100)	Staple length	Price per pound (CCC support price, Pickens County, S.C.)	Lint turnout per 1,500 lb. of seed cotton	Value per 1,500 lb. of seed cotton
	<i>Index</i>	<i>1/32 inch</i>	<i>Cents</i>	<i>Pounds</i>	<i>Dollars</i>
1969 and 1970 seasons:					
1-----	¹ 92.3a	¹ 35.4a	¹ 21.74a	¹ 524a	113.85a
2-----	95.9 b	35.1 b	23.27 b	513 b	119.39 b
3-----	98.5 c	35.1 b	24.13 c	509 b	122.75 b
Average-----	95.5	35.2	23.05	515	118.66
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)					
1-----	¹ 88.9a	¹ 35.4a	¹ 20.39a	¹ 531a	¹ 108.31a
2-----	93.1 b	35.2ab	22.17 b	521ab	115.54 b
3-----	95.7 c	34.9 b	22.96 b	519 b	118.26 b
Average-----	92.6	35.2	21.84	524	114.04

¹ Means within a column followed by the same letter or letters do not differ significantly from each other at the 1-percent level.

TABLE 10.—*Effect of lint-cleaning level on picker and card waste, 50s and 22s yarn strength, break factor, and appearance index*

Lint-cleaning level	Picker and card waste	50s yarn strength	22s yarn strength	Average break factor	Average appearance index
	<i>Percent</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Units</i>	<i>Index</i>
1969 and 1970 seasons:					
1-----	¹ 6.1a	¹ 41a	¹ 117a	¹ 2,314a	² 99a
2-----	5.5 b	40 b	114 b	2,249 b	97 b
Average-----	5.8	40.5	115.5	2,282	98
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)					
1-----	¹ 6.2a	¹ 43a	² 122a	¹ 2,427a	102
2-----	5.4 b	42 b	120 b	2,366 b	100
Average-----	5.8	42.5	121	2,396	101

¹ Means within a column followed by the same letter or letters do not differ significantly from each other at the 1-percent level.

² Means within a column followed by the same letter or letters do not differ significantly from each other at the 5-percent level.

APPENDIX

TABLE 11.—*Results of statistical analyses for experimental factors and test items, crops of 1969 and 1970*

Test item	Significance of differences in test results among factors ¹		
	Fiber-moisture level	Seed-cotton cleaning level	Lint-cleaning level
Seed-cotton cleaning system efficiency-----	**	NS	NA
Lint-cleaning system efficiency-----	NS	NS	**
Total waste in lint:			
Before lint cleaning-----	**	NS	NA
After lint cleaning-----	**	NS	**
Color (+b) (yellowness):			
Before lint cleaning-----	NS	NS	NA
After lint cleaning-----	*	NS	**
Color (R _d) (reflectance):			
Before lint cleaning-----	*	NS	NA
After lint cleaning-----	**	NS	**
2.5-percent span length:			
Before lint cleaning-----	*	NS	NA
After lint cleaning-----	**	NS	**
Uniformity ratio:			
Before lint cleaning-----	*	NS	NA
After lint cleaning-----	*	NS	**
Strength, 1/8-inch gage:			
Before lint cleaning-----	NS	NS	NA
After lint cleaning-----	*	NS	NS
Micronaire:			
Before lint cleaning-----	NS	NS	NA
After lint cleaning-----	NS	NS	NS
Grade index-----	**	NS	**
Staple length-----	**	NS	**
CCC support price (per pound)-----	*	NS	**
Lint turnout-----	**	**	**
Bale value-----	NS	NS	**
Seed germination-----	NS	NS	NA

¹ ** means significant at the 1-percent level; * means significant at the 5-percent level; NS means not significant; and NA means not applicable.

TABLE 12.—*Results of statistical analyses for experimental factors and test items for spinning lots, crops of 1969 and 1970*

Test items	Significance of differences in test results among factors ¹		
	Fiber-moisture level	Seed-cotton cleaning level	Lint-cleaning level
Picker and card waste.....	*	NS	**
50s yarn strength.....	**	NS	**
22s yarn strength.....	**	NS	**
Average break factor.....	**	NS	**
Average appearance index.....	NS	NS	*

¹ ** means significant at the 1-percent level; * means significant at the 5-percent level; and NS means not significant.

TABLE 13.—*Results of statistical analyses for experimental factors and test items, crops of 1968, 1969, and 1970*

Test items	Significance of differences in test results among factors ¹	
	Seed-cotton cleaning level	Lint-cleaning level
Seed-cotton cleaning system efficiency.....	NS	NA
Total waste in lint.....	NS	**
Color (+ b) (yellowness).....	NS	**
Color (R _d) (reflectance).....	NS	**
2.5-percent span length.....	NS	**
Uniformity ratio.....	NS	**
Strength, 1/8-inch gage.....	NS	NS
Micronaire.....	NS	NS
Grade index.....	NS	**
Staple length.....	NS	**
CCC support price (per pound).....	NS	**
Lint turnout.....	NS	**
Lint value per 1,500 pounds of seed cotton.....	NS	**
Seed germination.....	NS	NA

¹ ** means significant at the 1-percent level; * means significant at the 5-percent level; NS means not significant; and NA means not applicable.

TABLE 14.—*Results of statistical analyses for experimental factors and test items for spinning lots, crops of 1968, 1969, and 1970*

Test items	Significance of differences in test results among factors ¹	
	Seed-cotton cleaning level	Lint-cleaning level
Picker and card waste.....	NS	**
50s yarn strength.....	NS	**
22s yarn strength.....	NS	*
Average break factor.....	NS	**
Average appearance index.....	NS	NS

¹ **means significant at the 1-percent level; * means significant at the 5-percent level; and NS means not significant.

TABLE 15.—*Wagon seed-cotton trash and moisture contents for test variables*

Test variable and level	1969-70 season		1968, 1969, 1970 seasons ¹	
	Seed-cotton trash content	Seed-cotton moisture content	Seed-cotton trash content	Seed-cotton moisture content
	Percent	Percent	Percent	Percent
Fiber moisture:				
High (6 to 8 percent).....	3.5	10.7	¹ 3.4	¹ 10.8
Low (3 to 4 percent).....	3.7	10.4		
Seed-cotton cleaning:				
All machinery.....	3.6	10.6	3.5	10.7
Bypass stick machine.....	3.5	10.5	3.3	10.9
Lint cleaning:				
1.....	3.6	10.6	3.3	10.9
2.....	3.5	10.4	3.2	10.9
3.....	3.6	10.6	3.8	10.6

¹ For normal fiber-moisture level only.

TABLE 16.—Seed-cotton, lint, and seed moisture content for test variables, 1969 and 1970 seasons

Test variable and level	Moisture content of—			
	Seed cotton at feeder apron	Lint before lint cleaning	Lint at lint slide	Seed at seed drop
	Percent	Percent	Percent	Percent
Fiber moisture:				
High (6 to 8 percent)-----	¹ 9.6a	¹ 6.0a	¹ 5.6a	11.3
Low (3 to 4 percent)-----	8.2 b	3.9 b	3.9 b	10.9
Seed-cotton cleaning:				
All machinery-----	8.8	4.9	4.6	11.3
Bypass stick machine-----	9.0	5.0	4.9	10.9
Lint cleaning:				
1-----	8.8	5.0	4.8	(²)
2-----	9.0	5.0	4.8	(²)
3-----	8.9	4.9	4.7	(²)

¹ Indicates a difference in this group at the 1-percent level of significance.² Not applicable.

TABLE 17.—Effect of seed-cotton cleaning level on seed-cotton cleaning system efficiency, Shirley Analyzer and Colorimeter results

Seed-cotton cleaning level	Seed-cotton cleaning system efficiency	Shirley Analyzer results		Colorimeter results	
		Visible waste in lint	Total waste in lint	Degree of yellowness	Reflectance
	Percent	Percent	Percent	+b	R _d
1969 and 1970 seasons:					
Thru all machinery-----	59.0	1.7	2.7	9.0	74.4
Bypass stick machine-----	57.4	1.8	2.8	9.0	74.4
1968, 1969, and 1970 seasons: (6 to 8 percent moisture level only)					
Thru all machinery-----	54.5	1.7	2.7	8.8	72.7
Bypass stick machine-----	53.7	1.8	2.8	8.7	72.6

TABLE 18.—*Effect of seed-cotton cleaning level on Fibrograph results, strength, Micronaire, and seed germination*

Seed-cotton cleaning level	Fibrograph results		Strength ½-inch gage	Micronaire	Seed germination
	2.5-percent span length	Uniformity ratio			
	<i>Inches</i>	<i>Percent</i>	<i>Grams/tx</i>	<i>Reading</i>	<i>Percent</i>
1969 and 1970 seasons:					
Thru all machinery	1.11	46	24.0	4.7	79.4
Bypass stick machine	1.11	47	23.9	4.8	80.1
1968, 1969, and 1970 seasons:					
(6 to 8 percent moisture level only)					
Thru all machinery	1.11	46	25.3	4.7	78.9
Bypass stick machine	1.11	47	25.1	4.7	79.6

TABLE 19.—*Effect of seed-cotton cleaning level on classer's results, lint turnout, and lint value*

Seed-cotton cleaning level	Grade (Middling White = 100)	Staple length	Price per pound (CCC support price, Pickens County, S.C.)	Lint turnout per 1,500 lb. of seed cotton	Value per 1,500 lb. of seed cotton
	<i>Index</i>				
	<i>Index</i>	<i>32d inch</i>	<i>Cents</i>	<i>Pounds</i>	<i>Dollars</i>
1969 and 1970 seasons:					
Thru all machinery	95.8	35.2	23.14	¹ 511a	113.28
Bypass stick machine	95.3	35.2	22.94	519 b	119.04
1968, 1969, and 1970 seasons:					
(6 to 8 percent fiber moisture only)					
Thru all machinery	92.4	35.1	21.79	523	113.30
Bypass stick machine	92.7	35.2	21.89	525	114.78

¹ Means within a column followed by the same letter or letters do not differ significantly at the 5-percent level.

TABLE 20.—*Effect of seed-cotton cleaning level on spinning test results*

Seed-cotton cleaning level	Picker and card waste	50s yarn strength	22s yarn strength	Average break factor	Average appearance index
	<i>Percent</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Units</i>	<i>Index</i>
1969 and 1970 seasons:					
Thru all machinery	5.9	41	116	2,289	97
Bypass stick machine	5.7	40	116	2,274	99
1968, 1969, and 1970 seasons:					
(6 to 8 percent moisture level only)					
Thru all machinery	5.9	43	121	2,404	100
Bypass stick machine	5.7	42	121	2,389	102